Curriculum Vitae

Paul D. Shankland

Commander
Head, Plans and Requirements

United States Naval Observatory
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Objective: Research Astronomer (Exoplanets); Manager/Leader/Executive/Educator in Astronomical Research

Employment

Present Position: Head, Plans and Requirements: Navy Commander (senior O-5/GS-14 equivalent)

- Oversee near-term though 15 FY strategic research, project, institutional architecture, instrument/hardware planning, based on DoD, government-wide need, development of scientific fields involving astronomy, astrometry, celestial/spaceborne/GPS navigation, Command & Control, intelligence, earth orientation, IERS/ICRS and international atomic time service
- Interface with Pentagon, DoD, National level Position-Navigation-Time (PNT), GPS, astrometric, space committees (e.g., DoD Space Experiments Review Board, SERB)
- Align USNO mission with DoD, astrophysics/space communities, with vision with cutting-edge growth
- Supervise classified requirements for programs: space-borne National Technical Means (NTM), space situational awareness (SSA), space object identification (SOI), Advanced Capabilities Technology Development (ACTD), sub-nanosec two-way satellite time transfer
- Defend budget in the Congressional POM: $17.3M in FY05, 16.1M in FY06, 16.9M for PR07; currently, POM08 in defense at 20.9M
- Major program requirements oversight for Milliarcsecond Astrometric Pathfinder Satellite (costed through FY12 at $89M), USNO Robotic Astrometric Telescope (costed through FY10 at 5.1M), 6 Rb Fountain Clocks through FY10 at 5.1M, and Clock vault MILCON at 11.8M
- Planning, requirements oversight for operations: 26" Great Refractor (double star speckle interferometry); 24" Cassegrain, (exoplanet photometry), 12" Clark refractor (EPO); for 29 celestial catalogs (e.g., NOMAD, UCAC, USNO-A, B, Sloan, Tycho, WDS); OBSS (Origins Billion Star Survey) concept study, SIM-Planetquest reference tie-frame studies, TPF-I spectrometer design, Flagstaff AZ dark-site (with 1.55m, 1.3m, 1m instruments; 437m-baseline Naval Prototype Optical Interferometer (NPOI)
- Precise Time requirements oversight: Precise Time/Time Interval (PTTI); the US Master Atomic Clock operations, Rb/Cs Fountain Clock implementation, GPS Oversight; and Earth Orientation - notably VLBI, VLA, ICRS and IERS (International Celestial and Earth Reference Systems), the Radio Optical Reference Frame (RORF), NEOS, and Washington Correlator (WACO) operations
- Astronomical Applications requirements oversight:, ephemeredes development, software implementation, the Nautical Almanac Office
- **Clearance:** Top Secret, access to Sensitive Compartmented Information, current Single Scope Background Investigation since 1987

2001-2004: Commanding Officer (CEO Equivalent), Strike Training Squadron NINE

- Selected as deputy senior executive (COO equivalent), then Commanding Officer (CEO equivalent) in June 2003
- Navy's largest aviation squadron, Chief executive, senior pilot, educator to 550 instructor pilots, students, officers, civilians
- Responsible for training throughput: 175 US/international strike carrier pilots/year, representing $507M in training costs annually
- Annual operating budget averaged $45M. Directed staff of 85 seasoned Navy and Marine Corps officer instructor pilots, in addition to student carrier aviators and maintenance, administration, simulation, ground school, and ordnance staffs
- Taught all phases: formation/tactical, all-weather, aerobatics, out-of-control flight, weapons delivery, night formation, low-level ingress, air gunnery, air combat maneuvering (dogfighting), and carrier landings
- Squadron earned Chief of Naval Operations Safety "S"
- 15-month transition from aging T-2C *Buckeye* (retiring 87 jets net valued $217M), to the all-digital, delta-wing T-45C *Super Goshawk* (inducting 89 jets, representing $2.19 Billion in assets). Required complete airframe, syllabus, logistics and support reconfiguration. Awarded Meritorious Unit Commendation for model success
- Devised novel, 'lowest-level Voice' paradigm which allowed Instructors unusual creative latitude in meeting throughput; Result: highest (>38%) rates in 2004, despite weather and transition challenges. Morale extraodinarily high; 9 Fleet pilots 'rushed' me from Navy-wide
- While commanding, earned/awarded Masters of Astronomy with Distinction (*summa cum laude* equivalent), through evening study
- To date, accumulated over 3800 career flight hours, 374 arrested carrier landings. Flown (in hours order): E-2C, T-2C, T-45C, E-3A, HH-60, C-12/T-44, C-2A, T-34C, F-14D, TA-4J, miscellaneous Civil. Also possess civil Commercial Instrument/Multi/single engine license

1999-2001: Strike Operations Officer, USS Theodore Roosevelt

- Director, planning/coordination for every evolution for carrier *Roosevelt* and its 16-warship battle group
- Principle coordinator: wartime target assignment, weapons/aircraft assignment, strike planning, weaponeering, deconfliction
- Generated Air Tasking Orders for major strikes with his staff, using classified UNIX systems
- Head of coordination for aircraft carrier SEATRIAL and aircraft fight deck underway recertifications
- Began Masters of Astronomy program in off-time study program
- Initial deployment execution in response to "9/11"; led war planning
- Taught astronomy EPO-type classes to sailors at sea
- Arranged special EPO at-sea night sky talk on flight deck for 6000 sailors, marines and 3550 guests, 200 miles off Jacksonville FL

1996-99: DoD, Joint Interagency Liaison Head, Naval Air counter-drug operations to JIATF East: Coast Guard admiral's naval advisor on employment of Naval assets, strategy, tactics

- Acquired support for underfunded SATCOM programs, technology acquisitions for naval Aircraft (midwave FLIR, comms, IMINT, SEI)
- Educated all inbound air squadrons (incl DoD, DEA, FBI, USCG, UK, FR, AU assets) on air counternarcotics operations
- Participated in/oversaw numerous multi-ton cocaine transshipment interdictions. 550 Metric Tons interdicted during 3-year tour
- Assisted in an NRO program to determine effects of astronomical seeing on adaptive optics

1993-96: VAW-121, Aircraft Maintenance Officer (led 157 personnel), and Aerospace Safety Officer

- Lead carrier aircraft plane commander, instrument evaluator,functional check (FCF) pilot
- Flew Bosnia/Deny Flight combat Close-Air Support control missions; 7 month Delpoyment
- Ranked top officer/aviator in squadron by squadron Commanding Officer; Oversaw all Maintenance, $3.4M Ops Budget
- Devised Ultraportable 8" telescope system for at-sea use, EPO-type sailor outreach classes

1986-93: Flight School, VAW-120, VAW-122, VAW-120, Staff AEW Wing Atlantic: Instructor Pilot, Instrument Evaluator & Functional Check Pilot, Carrier Aircraft Plane Commander

- Wing Manpower, Security/OPSEC Manager and Administrative Director; 5 Command inspections
- retained FRS instructor pilot status, taught 34 students
- Fabrication of 16" driven telescope, electronic drive, for several local EPO/public outreach efforts.
- Air wing strike lead , admiral's representative for anti-ship operations.
- Earned 2 Golden Top Hook Awards on both deployments for top carrier landings
- Ranked first in primary flight training

1979-86: Midshipman, U.S. Naval Academy, USS Sellers: Math major, then commisioned. Qualified Surface Warfare Officer (record 5 months), combat "Officer of the Deck", while Combat Information Center Officer aboard a Navy Guided Missile Destroyer

- Self Defense Force Leader, Nuclear Weapons Security Officer. Led 39 personnel
- College: optics/lasers, electrical/systems engineering, astronomy, computers, in addition to majors courses in pure math
- College: Senior astrophysics research project: K-corrections of highly redshifted galaxies. Work with USNA 16" Cassegrain
- Pioneered summer internship program at the US Naval Observatory, 1982. Vice president of the USNA Astronomy Club, 1979-83

Education

- B.S. in Pure Mathematics (conc. Physics), U.S. Naval Academy, 1983
- US Naval Aviator Flight School, Primary, Advanced Jet, CAEW,1987
- Graduate school/ASO (aerospace safety) certification, Naval Postgraduate School, Monterey, 1995
- Masters in Astronomy (with Distinction), University of West Sydney, 2003
- *Currently*: PhD Student/ABD (Astronomy), James Cook University, expected to confer summer 2007

Research Experience, Projects and Proposals

- Extensive collaboration with UCSC/Lick Observatory (with G. Laughlin, E. Rivera) on differential photometry (terrestrial and stratospheric) of Exoplanet transits, with TransitSearch. Collaboration with UCSC (G. Laughlin) in radial velocity fitting (Systemic), begun Nov 2005
- P-I (with D. Blank, D. Boboltz, J. Lazio, G. White) for proposal to observe GJ-876 at 7-mm at VLA, begun May 2005
- P-I (with D. Blank) for proposal to observe GJ-876 at 3-mm at ATCA, begun August 2005
- Co-I (with D. Blank) for proposal to observe GJ-876 for exoplanet radial velocities at Gemini, begun November 2005
- Co-I (with J. Lazio, D. Blank, G. Laughlin, AAVSO, et.al.) for proposal to observe radio-optical non-thermal/magneto-auroral signatures of exoplanet systems Tau Boo, HD162020, 70 Vir, using GMRT and JCU, AU, AAVSO, USNO visual instruments, begun March 2005
- Work with University New South Wales on QSO spectral shift effects on the universal Fine Structure Constant, 2001
- Designed/built *TOPHAT* system (airborne stratospheric visual/IR precision CCD ccd/GPS/intensified digital collection system) to detect transits, research astroseismology, Vulcanoids, and Kuiper Belt objects and analyze near earth and binary asteroid occultations.
- Designed/fabricated a comprehensive computerized 16" f/5 telescope/observatory system to provide robotic/computer-driven tracking/pointing capability, error-correction, active optics, stepper-motor digital-analog interface, mobile observatory--used in masters
- Built cooled CCD camera for photometric/exoplanet research. Designed/built HeNe laser from scratch as optical alignment device
- Transceiver and antenna design/fabrication experience, building, antenna theory/construction, digital techniques

Honors and Awards

- DoD Military Outstanding Volunteer Service Medal for Educational Public Outreach (EPO) astronomy endeavors during 26-year career
- Other military decorations: 3 Meritorious Service Medals, 3 Navy Commendation Medals, 3 Navy Achievement Medals; 4 Joint Meritorious Unit Awards, 3 Meritorious Unit Commendations, a Navy Unit Commendation, a Command Battle "E", various other campaign/unit medals.
- Naval Aviator Wings, the Surface Warfare Badge, Naval Command insignia. Top Hook 1989, 1991; Hawkeye of the Year nominee 1991

Refereed Publications Submitted

- Shankland, P., et.al, 2005. A Search For Transits of the Planets Orbiting GJ 876, *Astrophysical Journal*, in submission

Refereed Publications

- Shankland, P., & Orchiston, W., 2004. Lost and Found: Saga of the Historic Clark Refractor at the U.S. Naval Academy*, JATS*, 26, 17
- Shankland, P., & Orchiston, W., 2002. Nineteenth Century Astronomy at the U.S. Naval Academy, 2002. *JAHH,* 5,165

Non-Refereed Publications

- Shankland, P., 2004. Pan-Spectral Imaging and Analysis of M31, *AA,* Issue 44.
- Shankland, P., 2002. Tidewater Observatory*, AA,* Issue 35.
- Shankland, P., 2002. Visit Amateur Astronomy, *AA,* Issue 36.
- Shankland, P., 1998. ATM List Help On The Internet*, AA,* Issue 18

Published Abstracts, Conference Presentations and Proceedings

- Shankland, P. D., et.al., 2005. A Photometric Monitoring Campaign to Check for Planetary Transits of GJ 876, *BAAS,* 206, 9.08
- Pepin, J. and Shankland, P., 2006. The Continuing Search for Exoplanet Transits in GJ 876, *BAAS,* 207, 212.08
- Shankland, P.., & Orchiston, W., 2003. in *Proceedings of the 25th IAU General Assembly,* in Commission 41 Working Group 3 Session 2: *History of Astronomy: Historical Instruments*, The Historic Clark Refractor at the US Naval Academy, ed, O. Engvold, (Provo: ASP)
- Shankland, P., Blank, D., Boboltz, D., & Lazio, J. 2006, in *Astrobiology Science Conf*:, VLA and ATCA Millimeter Search for Debris Rings about Multiplanet System GJ-876, eds. J. Minafra & T. Okimura, (Moffett Field, CA: NASA Ames), 358

Service to USNO

- Chairman/facilitator, 7th classified DoD Astrometry Forum (558 invited attendees/speakers, 33 abstracts/talks, 1 VIP Keynote)
- Deputy Navigator for Naval Aerospace Policy; Advisory support to Chief of Naval Operations Navigator of the Navy (NoN)
- USNO Fourier Transform Spectrometer Review Board
- SIM Science Team liaison, Events Coordinator, SIM conference 2005
- VIP Escort/Guide, telescope operator, for visiting senior governmental officials, 2004-6
- Events coordinator, Strategic Command National PNT Strategy Planning Session Oct 2005
- American Astronomical Society (AAS) Exhibition Presenter for USNO: January 2005, January 2006 (attendance 2400, 3000)
- Attended 41 Colloquia/professional seminars at USNO; 17 informal talks, 2004-6
- Representative National Precise Time & Time Interval (PTTI) Conference, 2004
- Representative Annual Institute of Navigation (ION) National Technical Conference, 2005
- Representative MIT / Lincoln Labs Space Control Conference, 2005
- Representative 2005 National Reconnaissance Office (NRO) MDA Technical Conference, 2005
- Representative to 6 GPS Technical Exchange Meetings (TEM), 2004-6
- Representative Air Force Maui Optical Supercomputing (AMOS) Astronomical/SSO/Control/Optical Technical Conference, 2005
- Lead Representative 5 Strategic Command National Position-Navigation-Time (PNT) Joint Capability Review Panels, 2005
- Representative, National Space Experiments Review Board (SERB), 2005
- Representative NOAA Navigation/GPS/Tsunami Warning Conference, 2005
- Representative Geospatial Intelligence Agency (NGA) senior Steering Committee for 2 Digital Aeronautical Navigational conferences, 2005
- Hosted 2 Colloquium Lecturers at USNO – D Blank (JCU), and G Laughlin (UCSC), 2005

Invited Talks (while at USNO)

- 3-hour talk on GJ 876 transit study, doctoral review and research to date, to USNO Staff (45 PhD attendees).
- One hour radio/webcast interview, "Slacker Astronomy", AAS Minneapolis June 2005

Teaching experience:

- Initiated new opportunity, became academic thesis advisor to US Naval Academy (USNA) senior, John Pepin; summer 2005 through academic year 2005-06 (3-credit course). Exoplanet /planet formation, detection, analysis, senior/graduate astronomical research project.
- Supervise a Yale astrophysics undergrad intern at USNO, Zachary Dugan, studying extrasolar planet transits and radial velocities.
- Taught aerodynamics, structures, navigation, meteorology, aviation psychology/physiology in 20-person classes, in simulator, and in cockpit: 1991-1993 at fleet replacement squadron; 2001-2004 in Strike Training Squadron Nine.

Professional Organizations, Memberships

- Full Member, American Astonomical Association (AAS) (DDA, DPS, HAD)
- American Institute of Physics
- Member, International Astronomical Union (IAU) Commission 41
- Founding member, International Commission for the History of Astronomy
- International Union for the History and Philosophy of Science
- US Astronomical League
- International Dark Sky Association

Computing Skills

- all Windows XP, Office, LINUX, TeX/LaTeX, HTML/webpage authoring, AIPS/MIRIAD, miscellaneous Astronomical; hardware
- Worked with C, Java, FORTRAN, Pascal, SBASIC/VBASIC